Surface Cleanliness Inspection Technology Development Facility

Purpose:

To quantitatively measure surface cleanliness with real time, in-process inspection instrumentation.

Cleanliness of critical surfaces is measured in numerous ways. Facilities and instrumentation are available to determine quantitatively contaminant levels on various types of substrates in real item processing environments. Inspection techniques include Fourier transform infrared (FTIR) spectroscopy, optically stimulated electron emission (OSEE) and ultraviolet fluorescence (UVF). Facilities for development of calibration standards for the instrumentation are also available within this department.

FTIR spectroscopic inspection previously available through in-direct evaluation of samples in the laboratory may now be conducted in-process. The Surface Optics Corporation (SOC) 400 reflectometer is a small hand held spectrometer with sensitivity equivalent to that of a laboratory FTIR microscope. Numerous attachments including diffuse and specular reflectance; grazing angle and attenuated total reflectance (ATR) heads insure inspection capability for all substrate types.

OSEE inspection is currently used in the reusable solid rocket motor (RSRM) program for cleanliness inspection prior to adhesive application. The technique is applicable to metal substrates for monitoring any chemical surface changes. This technique is sensitive to low level molecular contaminants that attenuate photoelectric emission from the substrate.

The UVF system is based on imaging UV excited fluorescence from contaminants on the substrate of interest. System features allow detection of contaminants on various metallic and non-metallic substrates.

As a complementary effort to the inspection technologies evaluation a calibration standards development effort was required. This effort developed ultrasonic spray application of repeatable low level contaminant films to substrates of interest. These standards were then used to correlate instrument response to known contaminant levels. Standards have been fabricated for commercial users through Space Act Agreements.

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